

REMARKS

Applicants respectfully request reconsideration of the application, as amended, in view of the following remarks.

The present invention as set forth in **amended Claim 1** relates to a photoreceptor, comprising:

an electroconductive substrate;

a charge generation layer located overlying the electroconductive substrate optionally with an intermediate layer therebetween; and

a charge transport layer formed overlying the charge generation layer using a non-halogenated solvent and comprising a charge transport material and a resin;

wherein the charge generation layer comprises

a polyvinyl acetal resin, and

a charge generation material having an average particle diameter less than a roughness of a surface of either the electroconductive substrate or the intermediate layer, on which the charge generation layer is located;

wherein the average particle diameter of the charge generation material is not greater than $0.3\ \mu\text{m}$ and not greater than $2/3$ of the roughness of the surface of either the electroconductive substrate or the intermediate layer;

wherein the charge generation material is a titanyl phthalocyanine;

wherein the titanyl phthalocyanine has an X-ray diffraction spectrum in which a maximum peak is observed at a Bragg (2θ) angle of $27.2^\circ \pm 0.2^\circ$ when a Cu-K α X-ray having a wavelength of $1.542\ \text{\AA}$ is used;

wherein the titanyl phthalocyanine further has a lowest angle peak at an angle of $7.3^\circ \pm 0.2^\circ$, and wherein an interval between the lowest angle peak to a next peak at a high angle side is not less than 2.0° ;

wherein the titanyl phthalocyanine has no peak at an angle of 26.3° ; and

wherein said titanyl phthalocyanine a peak in the X-ray diffraction spectrum at an angle of $23.5^\circ \pm 0.2^\circ$.

Amended Claim 28 relates to a photoreceptor, comprising:

an electroconductive substrate;

a charge generation layer located overlying the electroconductive substrate optionally with an intermediate layer therebetween; and

a charge transport layer formed overlying the charge generation layer using a non-halogenated solvent and comprising a charge transport material and a resin;

wherein the charge generation layer comprises

a polyvinyl acetal resin, and

a titanyl phthalocyanine having an average particle diameter less than a roughness of a surface of either the electroconductive substrate or the intermediate layer, on which the charge generation layer is located,

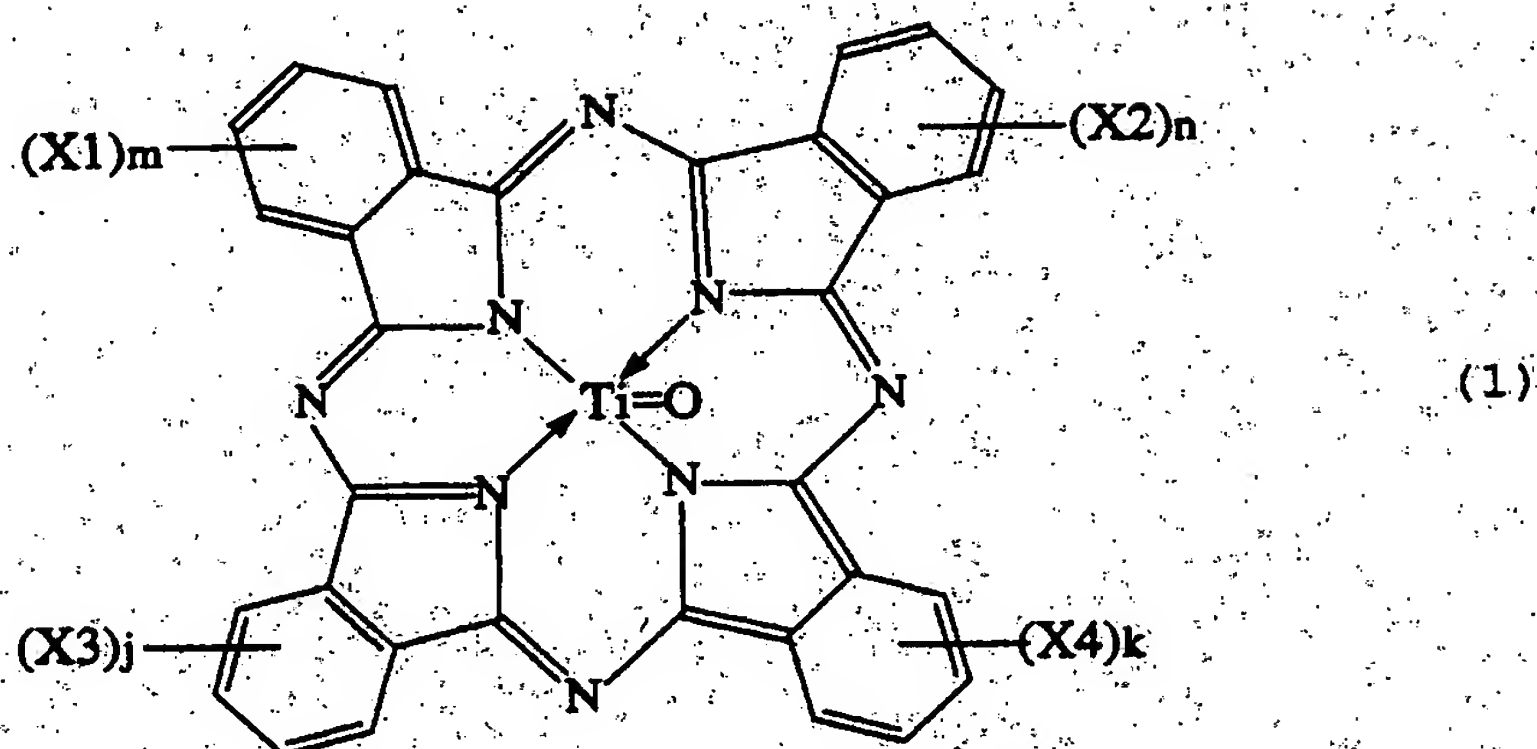
wherein the titanyl phthalocyanine has an X-ray diffraction spectrum in which a maximum peak is observed at a Bragg (2θ) angle of $27.2^\circ \pm 0.2^\circ$ when a Cu-K α X-ray having a wavelength of 1.542 Å is used,

wherein the titanyl phthalocyanine further has a lowest angle peak at an angle of $7.3^\circ \pm 0.2^\circ$, and wherein an interval between the lowest angle peak to a next peak at a high angle side is not less than 2.0° ;

wherein the titanyl phthalocyanine has no peak at an angle of 26.3° ;

wherein the average particle diameter of the charge generation material is not greater than $0.3\ \mu\text{m}$ and not greater than $2/3$ of the roughness of the surface of either the electroconductive substrate or the intermediate layer; and

wherein said titanyl phthalocyanine is represented by formula (1)



wherein X1, X2, X3 and X4 independently represent a halogen atom, and m, n, j and k are independently 0 or an integer of from 1 to 4.

New Claim 29 relates to the photoreceptor according to claim 28, wherein said titanyl phthalocyanine a peak in the X-ray diffraction spectrum at an angle of $23.5^{\circ} \pm 0.2^{\circ}$.

Yang, Takaya, Tamura, US 2002/0076633 A1, Niimi, Nukada, JP '337, Ladd et al, Oshiba, and Tamoto fail to disclose or suggest the photoreceptors claimed in Claims 1, 28 and 29-30. Yang, Takaya, Tamura, US 2002/0076633 A1, Niimi, Nukada, JP '337, Ladd et al, Oshiba, and Tamoto also fail to disclose or suggest the superior properties of the claimed photoreceptors as set forth in the specification.

Yang et al fails to disclose or suggest the structure of the titanyl phthalocyanine and the additional peak in the X-ray diffraction spectrum at an angle of $23.5^{\circ} \pm 0.2^{\circ}$.

Yang et al and Takaya et al do not provide a motivation for the combination of the titanyl phthalocyanine having the specified structure and/or peak at $23.5^{\circ} \pm 0.2^{\circ}$ and having an average particle diameter less than a roughness of a surface of either the electroconductive substrate or the intermediate layer and a charge transport layer formed using a non-halogenated solvent.

In order to protect environment, it is desired not to use a halogenated solvent when a photoreceptor is produced, particularly when a charge transport layer is prepared (because a large amount of solvent is used for preparing a charge transport layer). The object of the

present invention is to prepare a charge transport layer without using a halogenated solvent.

If a halogenated solvent is merely replaced with a non-halogenated solvent, the resultant photoreceptor is inferior in characteristics (such as photosensitivity). The reason therefore is as follows.

When a charge transport layer coating liquid including a non-halogenated solvent is coated on a charge generation layer, the charge generation material therein aggregates due to the solvent and thereby the specific surface area of the charge generation material decreases. Therefore, the probability that the charge generation material contacts with the charge transport material decreases, resulting in deterioration of photo-carrier generation efficiency, i.e., deterioration of photosensitivity. Therefore, it is necessary to prevent occurrence of aggregation of the charge generation material to avoid the photosensitivity deterioration problem. This can be achieved by controlling the surface roughness of the intermediate layer and the particle size of the charge generation material, the charge generation material aggregation problem can be avoided.

In other words, only after the following four points are understood, the present invention can be made:

- 1) to use a non-halogenated solvent;
- 2) when a non-halogenated solvent is used for preparing a charge transport layer on a charge generation layer, the charge generation material aggregates;
- 3) when the charge generation material aggregates, the photosensitivity of the resultant photoreceptor deteriorates; and
- 4) by controlling the surface roughness and the particle size of charge generation material, the charge generation material aggregation problem can be avoided.

Since these points are not disclosed and suggested in the references, the present invention is not obvious.

Specifically, there is no disclosure in these references that agglomeration of the charge generation layer can be avoided as disclosed at pages 17 and 18 of the specification.

There is also no disclosure of the superior results obtained in the Examples of the present invention. See pages 82-84 of the specification.

In addition, the Examiner has not provided a reference showing a charge generation material having an average particle diameter less than a roughness of a surface of the electroconductive substrate.

Moreover, the titanyl phthalocyanine (TiOPc) of the present invention is different from that of Yang et al. TiOPc of Yang et al is **ammonia modified TiOPc which different from Claim 28.**

The formula of the ammonia complex of titanyl phthalocyanine is illustrated in FIG. 2 of Yang et al. Specifically, the nitrogen atom of an ammonia molecule is bonded with the center metal (Ti) of the titanyl phthalocyanine by a coordination bond. The hydrogen atoms of the ammonia molecule are bonded with an oxygen of the titanyl phthalocyanine molecule by hydrogen bond. Thus, an ammonia complex is formed.

In contrast, the TiOPc of the present invention has the formula illustrated in paragraph [0070] of the publication of this application. Therefore, it is clear that the TiOPc of the present invention is different in formula from the ammonia complex of titanyl phthalocyanine.

Further, the ammonia complex of titanyl phthalocyanine is prepared by a method described in FIG. 7 of Yang et al and Claim 2 of Yang et al. Specifically, the ammonia complex is prepared by subjecting an amorphous TiOPc to a crystal change treatment in an organic solvent including ammonia. Therefore, in order to prepare the ammonia complex of titanyl phthalocyanine having the formula illustrated in FIG. 2 of Yang et al, ammonia has to

be actively used in at least one process of the preparation method of the ammonia complex of titanyl phthalocyanine.

In contrast, it is clear from Synthesis Example 1 of the present application that when the TiOPc of the present invention is synthesized, ammonia is not used in the synthesizing processes, i.e., the crude TiOPc preparation process, the acid pasting process and the crystal change process. Therefore, the ammonia complex of titanyl phthalocyanine having the formula illustrated in FIG. 2 of Yang et al is never prepared by the method used in the present invention.

The material of the present invention is different from that of Yang. FIG. 1 of Yang et al illustrates titanylphthalocyanine and FIG. 2 illustrates an ammonia complex of titanylphthalocyanine. As can be seen from these Figures, the compounds have different structures. Specifically, there are many phthalocyanine compounds having a different center metal, and/or a different crystal form. These compounds have different electrophotographic properties. The properties of a phthalocyanine compound can be determined only by experiments at the present time. Therefore, although the X-ray pattern of the ammonia complex of titanylphthalocyanine of Yang may be similar to that of the titanylphthalocyanine, the titanylphthalocyanine of the present invention is not obvious.

Niimi, Nukuda et al and Takaya et al, fail to disclose or suggest the combination of the titanyl phthalocyanine having the specified structure and/or peak at $23.5^{\circ} \pm 0.2^{\circ}$ and having an average particle diameter less than a roughness of a surface of either the electroconductive substrate or the intermediate layer and a charge transport layer formed using a non-halogenated solvent.

US 2002/0076633 A1, JP '337, Ladd et al, Oshiba, and Tamoto do not cure the defects of the primary references.

Application No.: 10/606,750

Reply to the Office Action dated: November 25, 2005

Applicants note that **Claim 15** should be allowable over Yang (US 5,567,559), Takaya (US 6,623,899 B2), Tamura (US 5,496,671), US 2002/0076633 A1, Niimi (US 2002/0051654 A1), Nukada (US 6,268,096 B1), JP '337, Ladd et al, Oshiba (US 6,399,262), Tamoto (US 2003/0073015), as it was not rejected over these references.

Therefore, the rejections of the Claims over Yang (US 5,567,559), Takaya (US 6,623,899 B2), Tamura (US 5,496,671), US 2002/0076633 A1, Niimi (US 2002/0051654 A1), Nukada (US 6,268,096 B1), JP '337, Ladd et al, Oshiba (US 6,399,262), Tamoto (US 2003/0073015), are believed to be unsustainable as the present invention is neither anticipated nor obvious and withdrawal of these rejections is respectfully requested.

The double patenting rejection over Serial No. 10/665,155 which as of January 22, 2006, was considered ready for issue by the Patent Office according to PAIR, is obviated by the Terminal Disclaimer filed herewith.

The Examiner is requested to withdraw the provisional double patenting rejections over Serial Nos. 10/804,067, and 10/655,280 if they are the only remaining rejections in the case. See MPEP 822.01.

The objection to the specification is obviated by the amendment of the specification at page 6.

The rejection of Claim 19 has as failing to comply with the written description requirement has been obviated by the amendment of Claim 19.

The rejection of Claim 27 is moot in view of the cancellation of Claim 27.

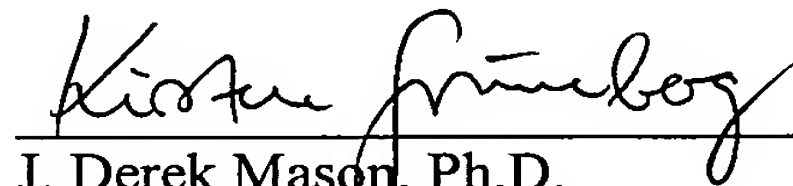
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This application presents allowable subject matter, and the Examiner is kindly requested to pass it to issue. Should the Examiner have any questions regarding the claims or otherwise wish to discuss this case, he is kindly invited to contact Applicants' below-signed representative, who would be happy to provide any assistance deemed necessary in speeding this application to allowance.

Respectfully submitted,

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